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Instruction Manual

The Megaligner

CROSLEY DIVISION
ARMAMENT ENGINEERING
AVCO MANUFACTURING CORP'N

PROPERTY OF ENGINEERING
TEST CONSTRUCTION

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48 HOUR LOAN

KAY ELECTRIC Co.
PINE BROOK, N. J.

INSTRUCTION MANUAL

THE MEGALIGNER

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SECTION I

INTRODUCTION

1.1 Description

The Megaligner is a calibrated variable frequency marker pip generator which covers the range from 19 to 49 mc. Its output is available either as a marker pip (fed to an oscilloscope independent of the circuit under test), as a tuneable CW signal source, or as a 4.5 mc. crystal oscillator CW source.

1.2 Specifications

1. Frequency range: 19 to 49 mc. in two bands - 19 to 30 mc. and 30 to 49 mc.

2. Pip output: Approximately 10 volts peak-to peak. (Maximum open circuit value developed in use with standard Mega-Sweep).

3. CW Output: Approximately 4000 microvolts across 50 ohms.

4. 4.5 mc. CW Output: Approximately 0.3 volt maximum across 50 ohms.

5. Frequency Calibration: Accurate to within ½ of 1%.

6. Power Requirements: .117 v, 50 to 60 cps.

7. Power Consumption: Approximately 40 watts.

8. Dimensions: 8" x 8" x 16".

9. Weight: 15 lbs.

1.3 Purpose

The Megaligner is designed for use in alignment of television sound and video IF amplifiers. In visual alignment it acts as a frequency marker generator, providing a variable frequency pip which remains visible in the traps and along a discriminator characteristic. Since the pip output is connected directly to the oscilloscope, it cannot overload the receiver. The Megaligner provides a variable frequency CW signal for those alignment techniques utilizing a vtvm as the voltage-indicating device. Its crystal-controlled 4.5 mc. CW signal is useful for intercarrier IF amplifier and video trap alignment.

1.4 General Circuit Description

In addition to a self-contained power supply, the Megaligner consists of a ~~6AG5~~ 6AH6 RF buffer amplifier, a 6AK5 variable frequency oscillator and detector, a 6J6 audio-frequency amplifier, and a 6AG5 crystal oscillator.

A B-supply switch (S.P.D.T.) activates one or the other of the oscillator tubes. With the S.P.D.T. B-supply switch in the XTAL. OSC. position, the crystal oscillator tube is activated, and oscillation will take place at the crystal frequency of 4.5 megacycles. With the B-supply

switch in the VAR. OSC. position, the variable frequency oscillator tube is activated and oscillation will take place at the frequency to which the band switch and the tuning dial are set.

A D.P.D.T. band selector switch connects either of two L C circuits between control grid and cathode of the 6AK5 variable oscillator. These L C circuits function also as the plate load impedance for the 6AG5 RF buffer amplifier which provides amplification at the frequency to which the circuits are resonated. The RF buffer amplifier acts primarily to isolate the variable oscillator from the television set under test.

In developing a pip, sweeping oscillator signal from the Mega-Sweep is fed through the buffer amplifier to the 6AK5 variable oscillator and detector stage. The resultant beat note obtained from the variable oscillator and the incoming sweeping oscillator signal is passed on through a tuned (10 kc.) network to the 6J6 audio frequency amplifier and thence to the PIP OUTPUT terminals of the Megaligner.

SECTION II

OPERATING INSTRUCTIONS

2.1 Preliminary

The space inside the top cover of the instrument is packed with tissue paper to protect the tubes during shipment. This packing should be removed before operating the unit.

2.2 Power Input

The instrument should be connected to the 117 volt, 50 to 60 cps. line. The power consumption is approximately 40 watts.

2.3 Controls

A. General

Reference should be made to the instrument front panel or to Fig. 1. Switch ON-OFF is a toggle switch which controls the 117 volt AC power. A pilot light indicates the presence of the 117 volt AC power. A 3 amp. fuse is replaceable from the front panel.

B. PIP AMPLITUDE control

The PIP AMPLITUDE control (P2 in Fig. 1) is a potentiometer in the output circuit of the 6J6 audio amplifier across which the pip voltage is developed. It adjusts the amount of pip voltage delivered to the PIP OUTPUT terminals.

C. BAND switch

The BAND switch (S3 in Fig. 1) is a D.P.D.T. toggle switch which selects either of two operating bands for the 6AK5 variable oscillator. In its "LOW" position it selects the 19-30 mc. band; and in its "HIGH" position, the 30-49 mc. band.

D. CW OSC. switch

The CW OSC. switch (S5 in Fig. 1) is a B-supply switch which activates either one of the two oscillator tubes. In its "VAR." position it energizes the variable frequency (19-30 and 30-49 mc.) oscillator while in its "XTAL" position it energizes the 4.5 mc. crystal oscillator.

E. CW OSC. OUTPUT controls

1) ON-OFF switch

The CW OSC. OUTPUT ON-OFF switch (S2 in Fig. 1) connects the CW signal either to the "OUTPUT" female coaxial connector on the front panel or to ground.

2) INCREASE control

The CW OSC. OUTPUT INCREASE control (P1 in Fig. 1) is a potentiometer in the output circuit of the 6AG5 crystal oscillator;

the output of the variable oscillator is capacitively coupled to its center arm. This control adjusts the amount of CW signal delivered to the coaxial OUTPUT connector from either oscillator, and is used only when the CW OSC. OUTPUT ON-OFF switch is in its "ON" position.

F. CAL switch

The CAL switch is a momentary B-supply switch which, when pressed, activates both oscillator tubes at the same time. It is actuated when it is desired to use harmonics of the 4.5 mc. crystal oscillator to check the calibration accuracy of the variable oscillator or to re-align the trimmer adjustments of this oscillator. Procedure for these operations follows.

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SECTION III

CALIBRATION OF THE VARIABLE OSCILLATOR

3.1 Calibration Check

The calibration of the variable oscillator can be checked against the harmonic output of the 6AG5 crystal oscillator. This is most conveniently done using the Megaligner and an oscilloscope with the PIP OUTPUT terminals of the Megaligner directly connected to the vertical input terminals of the scope.

In checking for calibration, the Megaligner controls should be positioned as follows: CW OSC. switch in VAR. position, CW OSC. OUTPUT switch in ON position, CW OSC. OUTPUT and PIP AMPLITUDE potentiometers rotated half a turn clockwise, momentary switch depressed to CAL position. The variable oscillator is then set to beat with a particular harmonic (see below) of the crystal oscillator by tuning the variable frequency oscillator until a visible beat note appears on the oscilloscope screen.

The useful harmonic check points are as follows:

	HARMONIC	FREQUENCY	TRIMMER
LOW BAND	5th	22.5 mc.	Slug on L1
	6th	27.0 mc.	Capacitor C20
	HARMONIC	FREQUENCY	TRIMMER
HIGH BAND	7th	31.5 mc.	Slug on L2
	10th	45.0 mc.	Capacitor C24

3.2 Trimmer Adjustments

Any excessive departure from an accurate calibration may be trimmed out by adjustment of the L1 inductive trimmer and the C20 capacitive trimmer for the low band; the L2 inductive trimmer and the C24 capacitive trimmer for the high band. Ordinarily, adjustment of the capacitive trimmers alone will produce the necessary corrections. The trimmer adjustments are located inside the Megaligner chassis which must be removed from the cabinet for this operation. The high band trimmers are those located nearest the main tuning capacitor.

3.3 Trimming-up Procedure

For example: In trimming up the low band oscillator adjustments for better calibration accuracy, the variable oscillator is set to zero beat with the 5th harmonic of the 4.5 mc. crystal oscillator in the 22.5 mc. region of its dial scale and with the 6th harmonic in the 27.0 mc. region and the scale readings are noted. Adjustment is then made of C20 to achieve zero beat with the crystal oscillator harmonic when the variable oscillator dial is set at exactly 27.0 mc.; and adjustment is made of the L1 tuning slug to achieve zero beat with the crystal oscillator harmonic when the variable oscillator dial is set at exactly 22.5 mc. This process is repeated several times to work out any interaction of these trimming adjustments. The procedure for the high band is

as given below.

In trimming up the high band oscillator adjustments for better calibration accuracy, the variable oscillator is set to zero beat with the 7th harmonic of the 4.5 mc. crystal oscillator in the 31.5 mc. region of its dial scale and with the 10th harmonic in the 45.0 mc. region and the scale readings are noted. Adjustment is then made of C24 to achieve zero beat with the crystal oscillator harmonic when the variable oscillator dial is set at exactly 45.0 mc.; and adjustment is made of the L2 tuning slug to achieve zero beat with the crystal oscillator harmonic when the variable oscillator dial is set at exactly 31.5 mc. This process is repeated several times to work out any inter-action of these trimming adjustments.

SECTION IV

INTERCONNECTIONS TO OTHER EQUIPMENT

4.1 Connections for TV Alignment

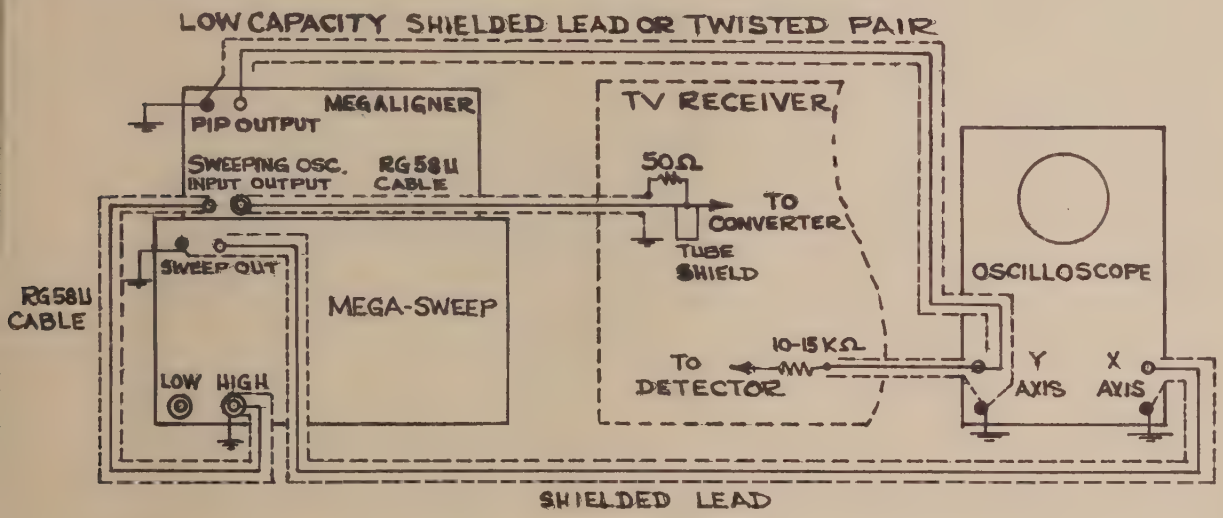

Fig. 2 MEGALIGNER CONNECTIONS IN TV ALIGNMENT SETUP

When used with the Mega-Sweep, the Megaligner is connected as shown in Fig. 2. The attached INPUT cable of the Megaligner is connected to the HIGH OUTPUT connector of the Mega-Sweep, and the RF cable provided with the Mega-Sweep is connected from the OUTPUT connector of the Megaligner to the television converter tube. The PIP OUTPUT is connected directly to the vertical amplifier input posts of the oscilloscope.

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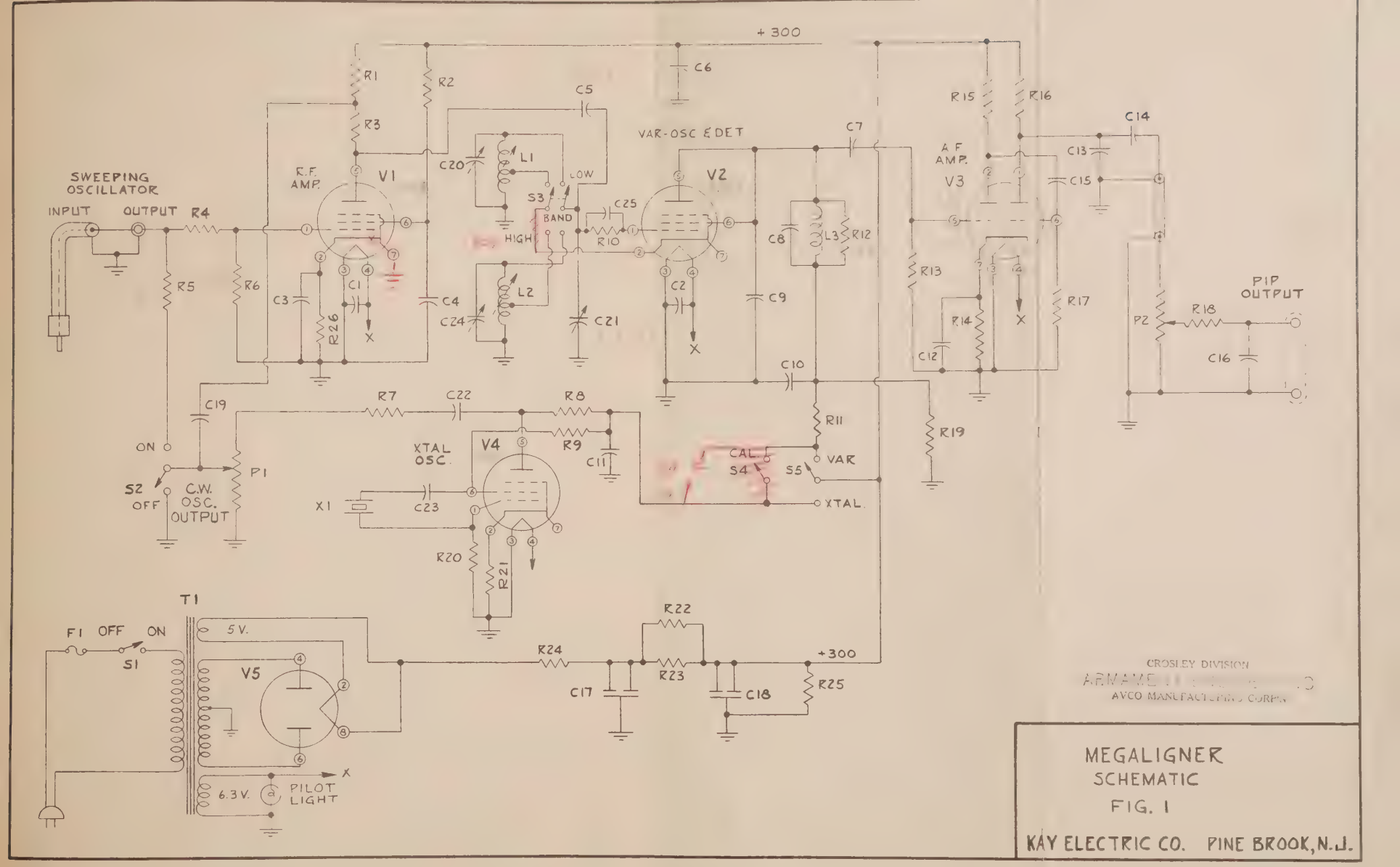

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MEGALIGNER
SCHEMATIC
FIG. 1

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PARTS LIST

MEGALIGNER

Tubes

~~V1~~,4	6AG5
V2	6AK5
V3	6J6
V5	5Y3
V1	6BH6

Resistors	Value(ohms)	Rating(watts)
R1,3,8	12,000	1
R2,9	56,000	1
R4	51	1/2
R5	180	1/2
R6	470	1/2
R7	100	1/2
R10	22,000	1/2
R11	~~47,000~~ 27K	~~1~~ 2
R12	1,500	1/2
R13,15,16,17,25	100,000	1/2
R18	~~50,000~~ 47K	1/2
R19	47,000	1
R20	33,000	1/2
R21	~~220,000~~ 330K	1/2
R22,23	4,700	1
R24	1,000	5
R26	~~150~~ 100~	1/2

R14 = 1K 1W
R27 = 51K 1W

Condensers	Value	Rating
C1,2,3,4,9,23	0.001 mfd.	500
C6,11	0.0033	500
C8,22	0.01	~~400~~ 300
C10,14	0.1	400
C12	25.	25 (electrolytic)
C17,18	20-20	450 (electrolytic)
C5	5 mmf.	500
C7,15	400	500
C13,16	~~240~~ 230	500
C19	~~0.75~~ ~~20~~ 2 mf	500
C20,24	1-8 ~~0.5 - 1.5~~ mmf.	(Variable)
C21	10-55 "	(Variable)
C25	30	500

Inductors

L1,2	Special, Type #7470068-1
L3	50 microhenries

Crystal

X1	4500 kc.	Petersen Type F-2

Switches	Type	Panel Designation
S1	SPST	ON-OFF
S2	SPDT	CW OSC. OUTPUT ON-OFF
S3	DPDT	BAND
S4	SPST (Momentary)	CAL
S5	SPDT	CW OSC. VAR-XTAL

PARTS LIST

MEGALIGNER

Potentiometers	Value(ohms)	Type	Panel Designation
P1	~~200,000~~ 200K	J	CW OSC. OUTPUT - INCREASE
P2	~~500~~	J	PIP AMPLITUDE

Pilot Light

#44 or #47 Bayonet Type

Fuse

F1 3 amp.

PIP OUTPUT
GND
PIP AMPLITUDE
MEGALIGNER
KAY ELECTRIC CO.
PINE BROOK
NEW JERSEY
LOW
HIGH
BAND
VAR
XTAL
CW OSC.
INPUT
OUTPUT
SWEEPING
ON
OFF
INCREASE
CW OSC. OUTPUT
CAL
POWER
ON
OFF

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